Tests of ORCA 3 calorimetry

especially release20_9_99

This version has an interesting feature. You can not turn off the noise. As you'll see, this will dominate the features of my plots.

hardwired noise: gaussian in e
        rms 30 MeV in ebry
            150 MeV in efry
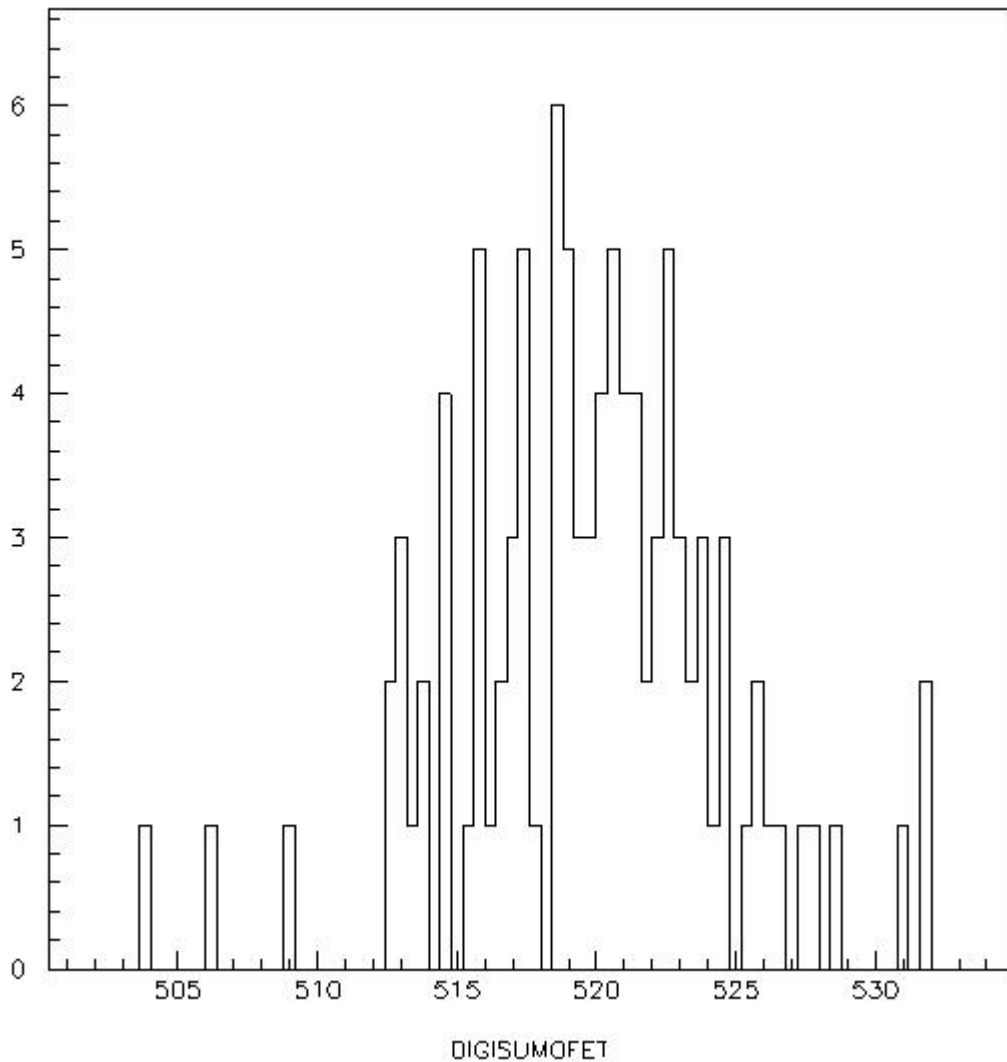   0 in hcal
        noise cut 30 MeV in efry
                150 MeV in efry
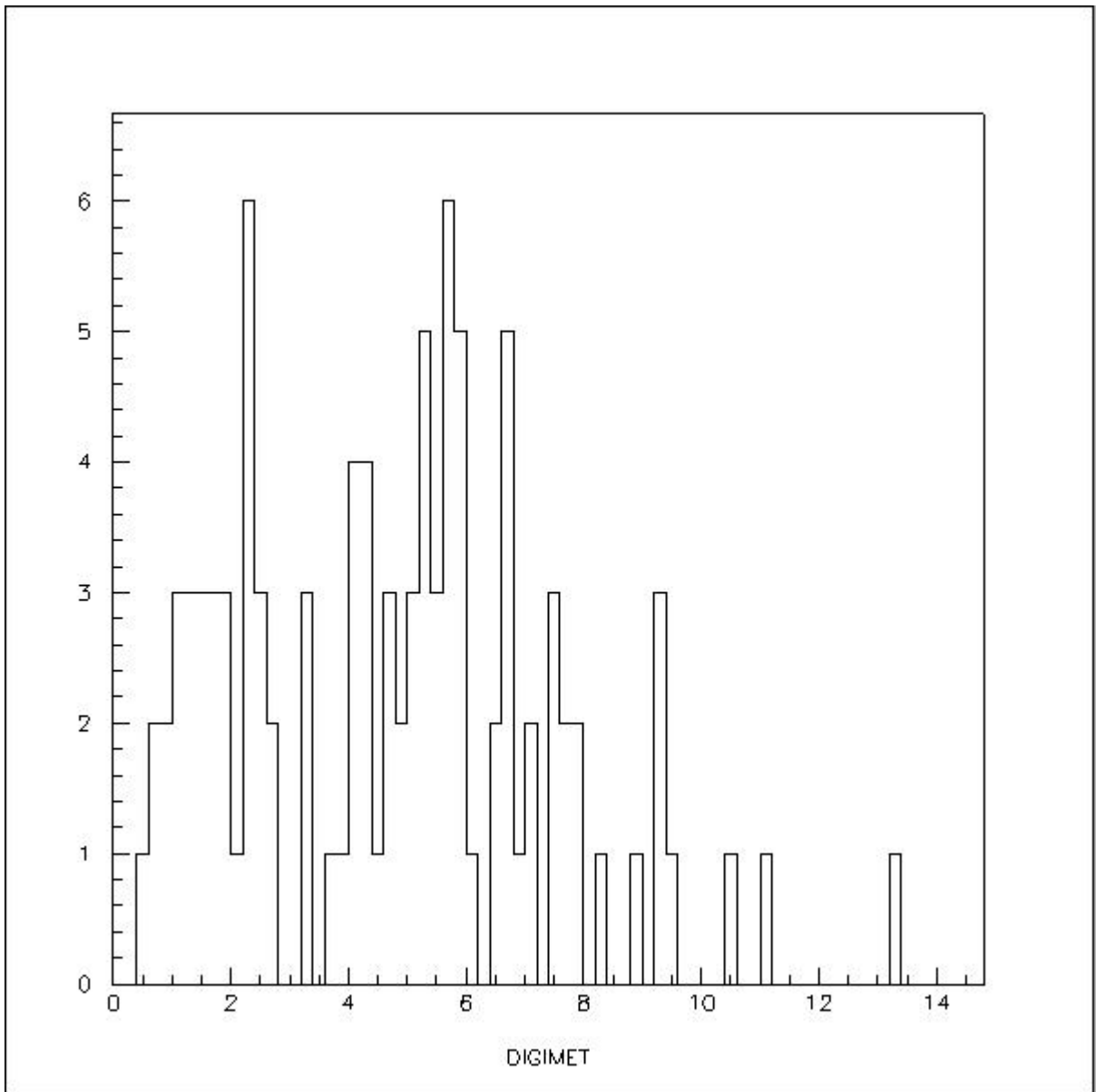   100 MeV in hcal

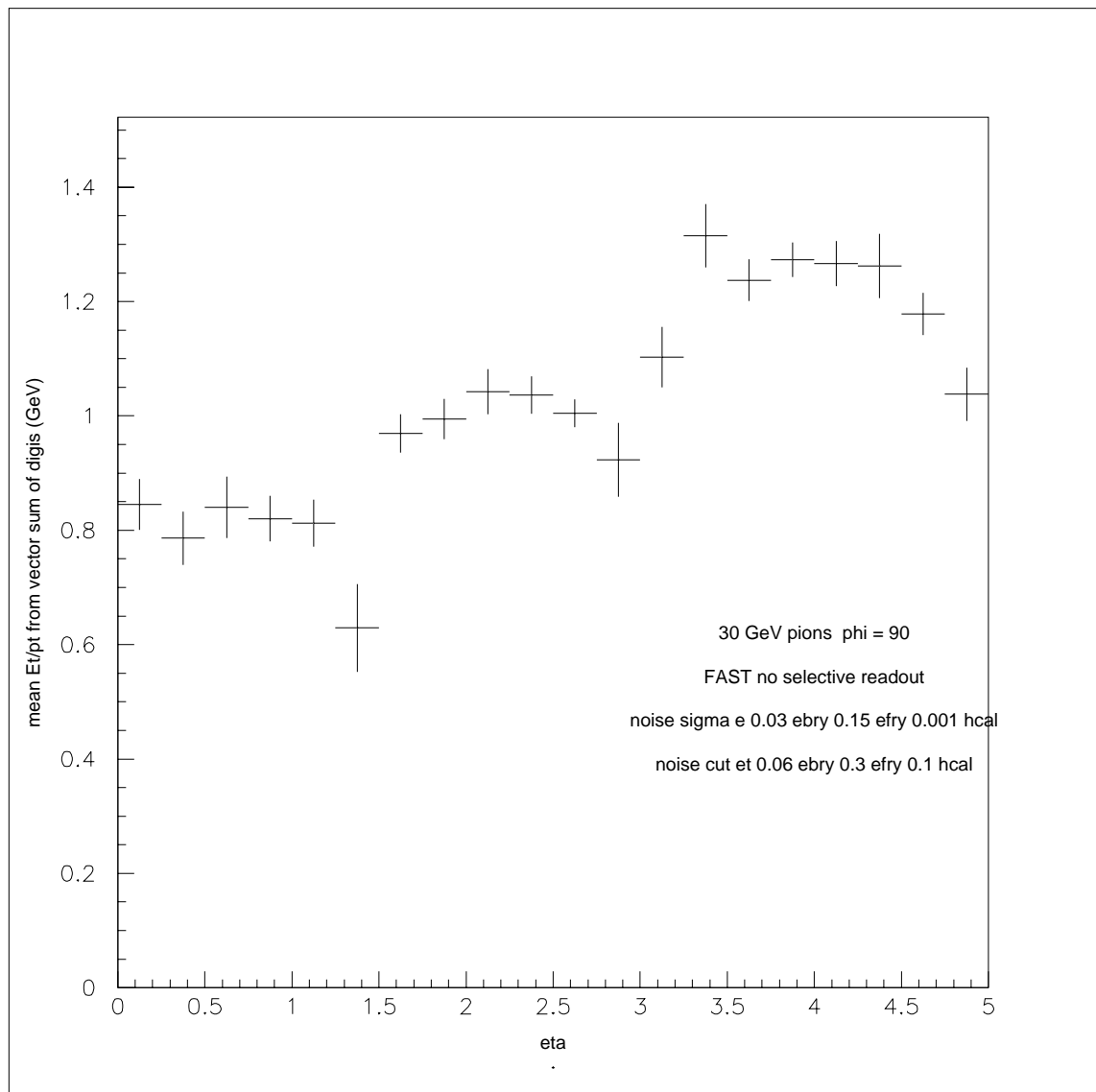92880 ebry channels… 15% e noise > 60 MeV… .15*92880*0.03 = 420 GeV of noise! typical min bias event has 60 GeV scalar Et!

Scalar Sum of Et in events containing single pions, et=3 GeV with thresholds at at default levels
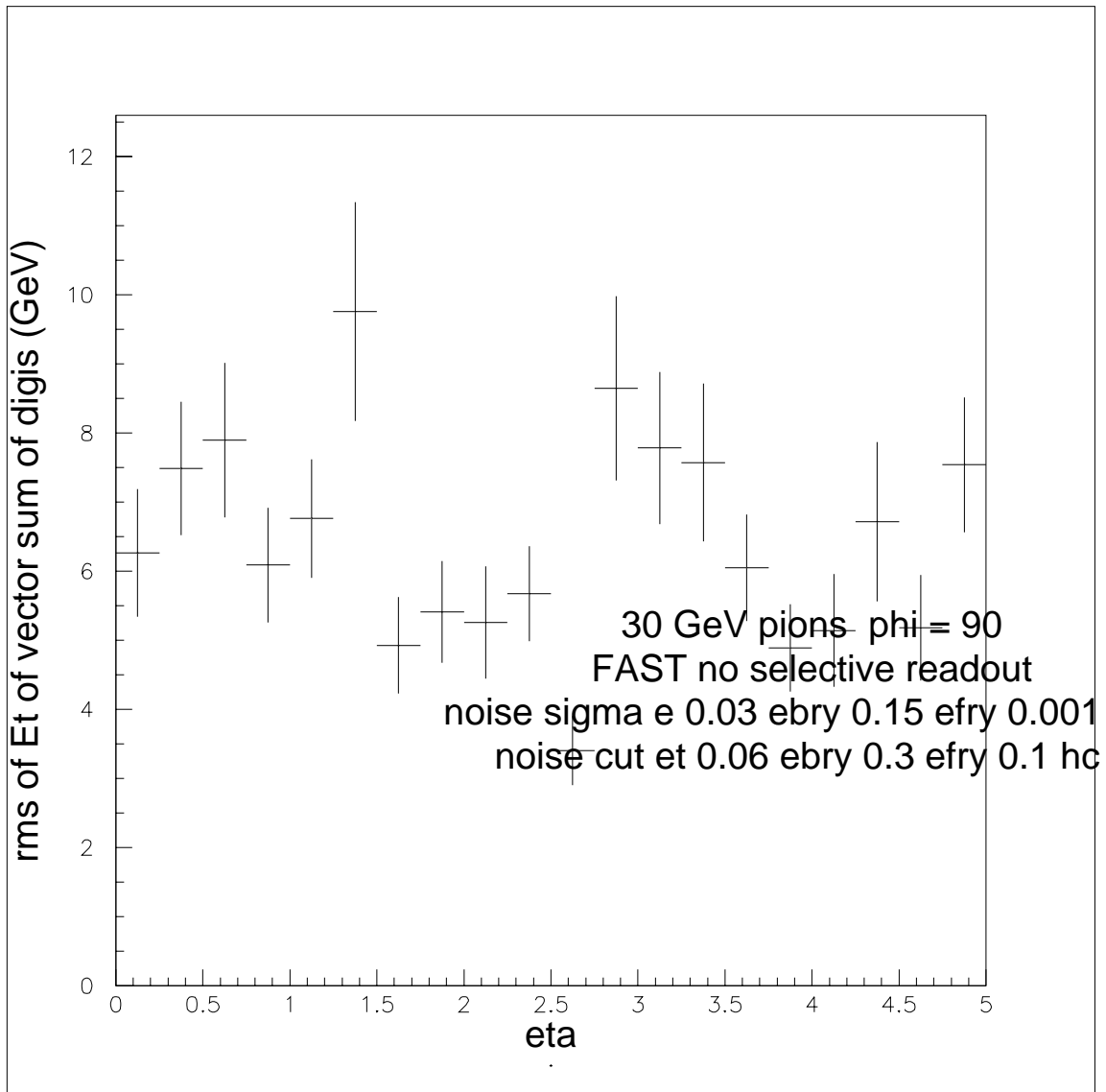
simple calc is in reasonable agreement.

DIGIMET

vector sum of et more reasonable, but
still high.
would be best to use jet-finder to minimize
noise. but, that doesn't work yet… (for me)

mean Et/pt from vector sum of digis (GeV)

eta

30 GeV pions phi = 90

FAST no selective readout

noise sigma e 0.03 ebry 0.15 efry 0.001 hcal
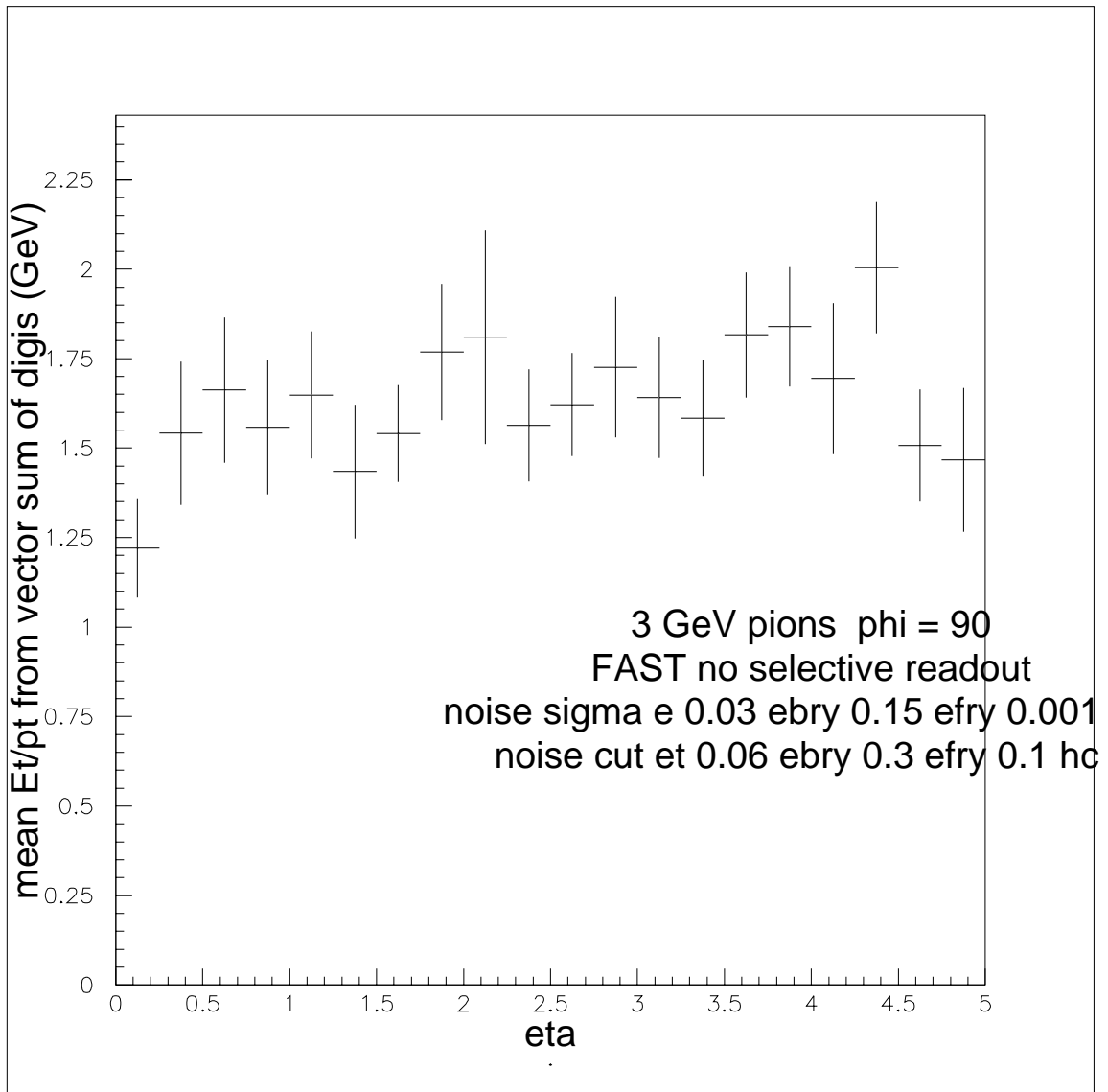
noise cut et 0.06 ebry 0.3 efry 0.1 hcal

I use 2 sigma cuts in ebry, efry in what follows.
(60 MeV, 300 MeV). These are SUBSTANTIAL
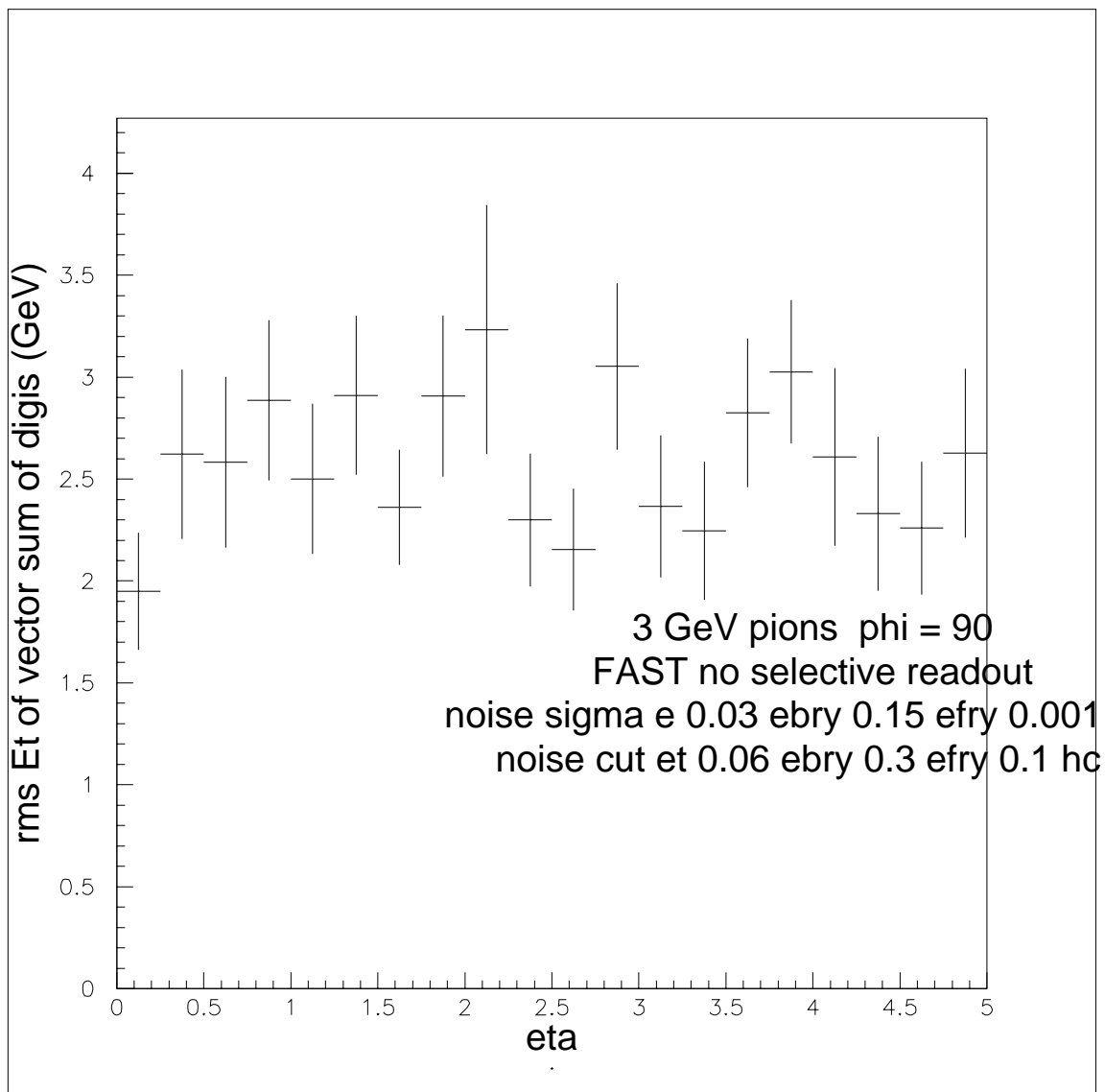cuts!! (also, I cut in Et, should have cut in e)

E/P for 30 GeV pions looks reasonable, but not
great.

rms of Et of vector sum of digis (GeV)

12

10

8

6

4

2

0

30 GeV pions phi = 90
FAST no selective readout
noise sigma e 0.03 ebry 0.15 efry 0.001
noise cut et 0.06 ebry 0.3 efry 0.1 hc

0   0.5   1   1.5   2   2.5   3   3.5   4   4.5   5

eta

resolution should be sqrt(30) = 5 GeV

The plot is titled with axis labels "mean Et/pt from vector sum of digis (GeV)" (y-axis) and "eta" (x-axis), and contains the annotation:

3 GeV pions phi = 90
FAST no selective readout
noise sigma e 0.03 ebry 0.15 efry 0.001
noise cut et 0.06 ebry 0.3 efry 0.1 hc
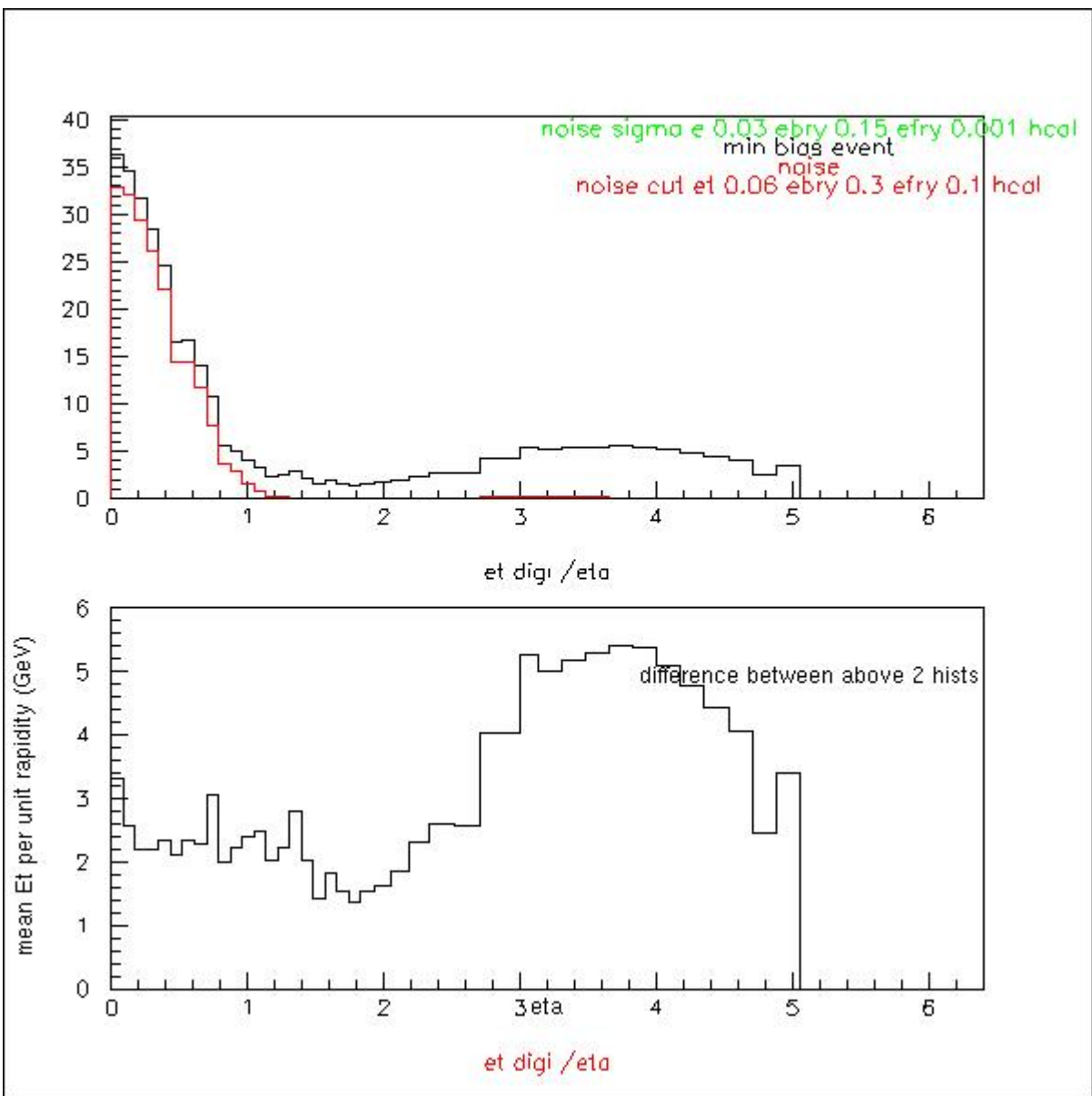
E/P for 3 GeV pions is high. probably noise effect.

rms should be sqrt(3) = 1.7 GeV
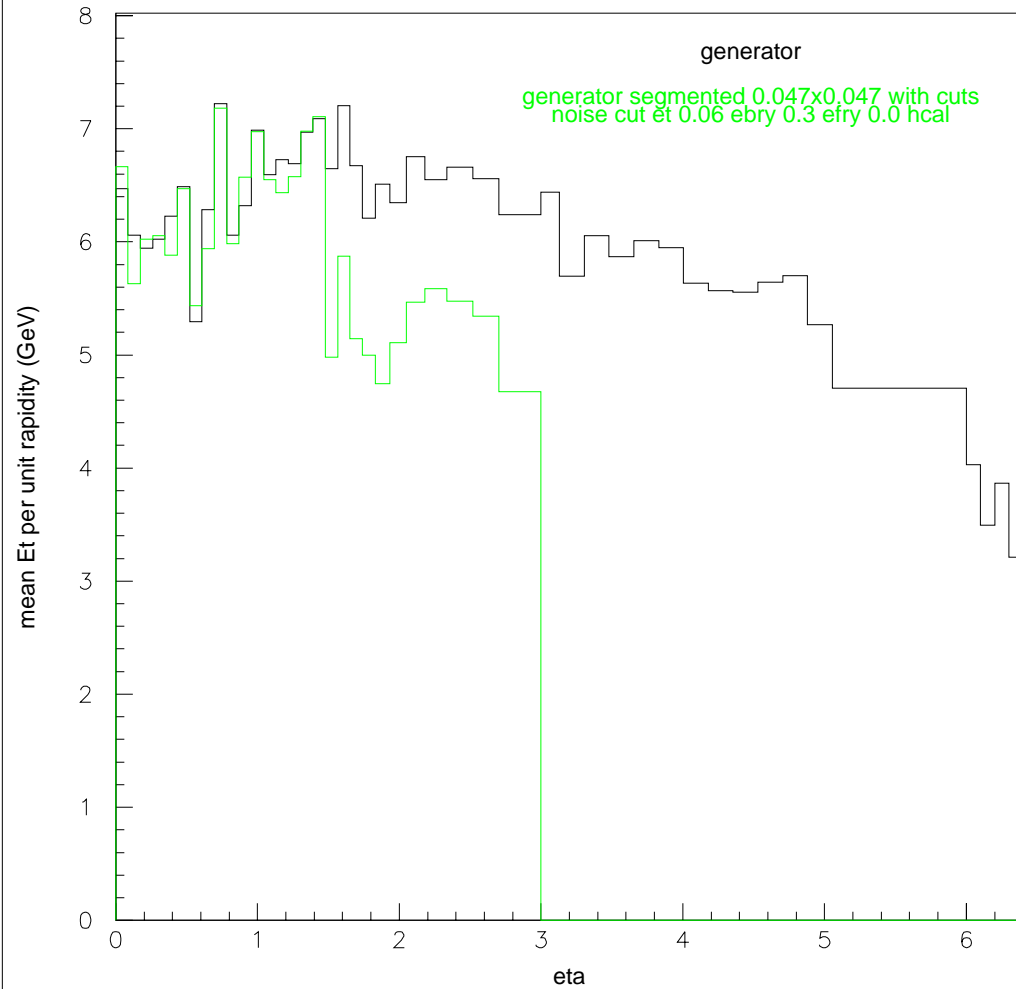
simple generator level study to see how the cuts effect energy flow in min bias events. clustered gen particles into 0.047x0.047 towers and applied ebry, efry cuts (did et, should have done e).
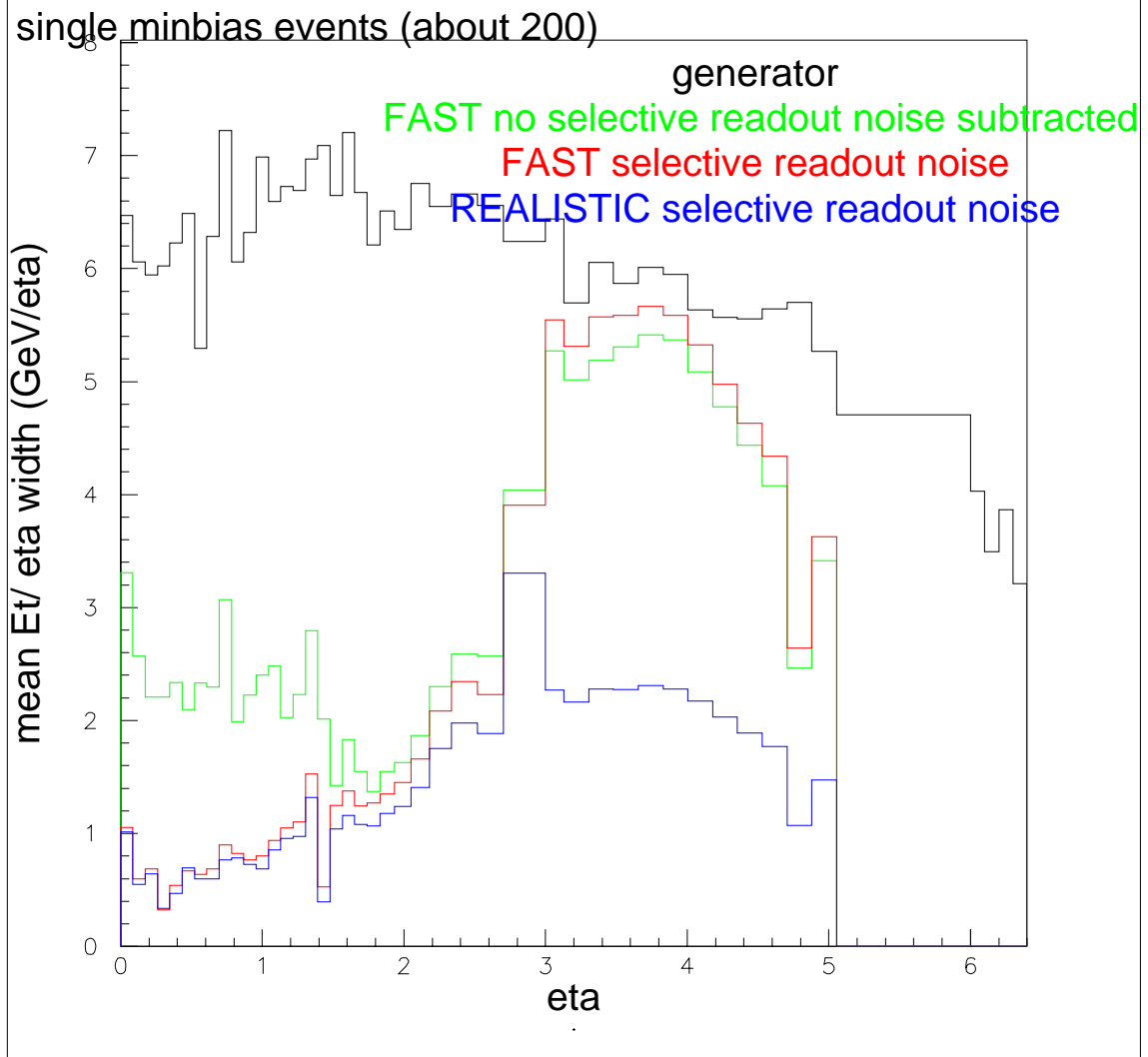
min bias event
noise event (single particle events using info
from towers at least 90 degrees away in phi)
difference.
event is dominated by noise. will make
parameterizing met resolution in terms of
scalar et challenging.

single minbias events (about 200)

generator
FAST no selective readout noise subtracted
FAST selective readout noise
REALISTIC selective readout noise

mean Et/ eta width (GeV/eta) vs eta

Selective readout seems to be more strict than my cuts! will have strong effect on MET resolution!